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Attorney's Docket No. 20864.00600 - PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/176,639	Examiner: S. Kumar
Applicant: Richard Robert Schediwy et al.	Group Art Unit: 2675
Filing Date: October 20, 1998	Attorney Docket No. 20864.00600
TITLE: FINGER/STYLUS TOUCH PAD	

Crosby, Heafey, Roach & May
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BRIEF ON APPEAL

Commissioner of Patents and Trademarks
Washington D.C. 20231

Sir:

This is a brief on appeal for consideration by the Board of the final rejection dated December 5, 2000, rejecting claims 1-7, 11 and 12. A timely Notice of Appeal was filed on June 4, 2001.

REAL PARTY IN INTEREST

The only real party in interest regarding the present application is Synaptics, Inc., assignee of the present application.

RELATED APPEALS AND INTERFERENCES

To the best of applicant's knowledge, there are no appeals or interferences which will directly affect or be directly affected by or have a bearing upon the Board's decision in the present appeal.

STATUS OF CLAIMS

Claims 1-7, 11 and 12 stand rejected under 35 U.S.C. § 103 as being unpatentable over references which will be discussed below. Claims 8-10 were merely objected to in that these claims were deemed to be allowable if written in independent form.

STATUS OF AMENDMENTS

There were no amendments filed subsequent to the final rejection.

SUMMARY OF THE INVENTION

The present invention involves a touchpad module for use with an electronic device, such as a notebook computer, which makes use of such a module to implement user input functions. The touchpad module is configured of certain insulative and conductive layers as to enable the electronic device to sense input data from both a finger and stylus.

It is well recognized that capacitive touchpads, such as those described in the "Background of the Invention" section of the present application work well with fingers, but are normally unable to sense a pen or stylus. Capacitive touchpads are typically used as pointing devices. Resistive touchpads work well with pens, but require an uncomfortable amount of pressure when used with fingers. Resistive touchpads are typically used as writing or drawing input devices. To date, there has been no practical touchpad which would work well with both fingers and pens along with a single input device to serve both functions. Such a touchpad would be especially valuable in portable applications where space is at a premium.

As a consequence, the present invention is directed to a touchpad module to implement user input functions to an electronic device which comprises a sensor layer having a length and width for a detecting position of a conductive object in contact with the touchpad module. An insulative layer is positioned over and contiguous with a sensor layer and a moderately conductive layer is positioned over and continuous with the insulative layer to provide a touchpad module which can be used as both capacitive and resistive elements which are commonly used to receive input information from both a finger and conductive stylus.

In pointing to the specification, Fig. 2 shows the effect of a finger on a sensor of the prior art, that is, a capacitive sensor intended to accept positional data by the application of a fingertip to the touchpad module. Above electrodes

202 is an insulating layer 201 which provides surface 203 over which finger 204 is detected. In operation, each electrode on electrode layer 202 provides one plate of a capacitor and finger 204, if present, provides a second plate, with insulating layer 201 forming the dielectric between them. The conductance of the human body, combined with the human body's inherent capacitance to free space, causes the finger to appear to be electrically grounded in terms of its capacitance to the electrodes. Sensing electrodes scan the array of electrodes for increased capacitance to ground caused by the presence of a finger or other object over them. By measuring the capacitance on both the horizontal and vertical electrodes, the location of a finger can be determined.

As further noted in the specification, the great majority of pen-actuated touchpads currently manufactured use resistive, not capacitive, sensors. In a resistive touchpad, pressure from the finger or stylus pushes a flexible conductive membrane against another conductive surface and thereby detects a measurable electrical signal. The resistive touchpad works well with a pointed stylus, but because it requires actual pressure, the resistive pad is uncomfortable to use with a finger. Also, the large contact area of a finger reduces the accuracy of a resistive pad. Finally, because the resistive touchpad contains moving parts, it is more fragile than a capacitive touchpad. Hence, a capacitive touchpad that works with a point-tip stylus would be of considerable value in the marketplace. The present invention involves placing a moderately conductive layer above the

insulating layer, so that the grounded conductive stylus makes contact with the moderately conductive layer. The conductive layer effectively spreads out the ground image of the tip of the stylus, forming a large second capacitor plate which can be sensed by more than one electrode on each of the horizontal and vertical axes. For best operation, the conductivity of the surface layer should be chosen such that the image of the stylus is about the same size of the image generated by a finger on a normal capacitive sensor noting the similarity of capacitance of graphs 205 of Fig. 2 and 506 of Fig. 6.

ISSUES

The only issues which remain in the present application are whether various groupings of claims were correctly made the subject of the final rejection in light of various combinations of prior art, all of which involve citation of Grabner et al. (U.S. Patent No. 4,731,694) as the principal reference. As such, the Board is now called upon to determine the appropriateness of the following rejections, namely:

Claims 1, 2, 6 and 10-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Grabner et al.,

Claims 3-5 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Grabner et al. in view of Friend et al. (U.S. Patent No. 5,455,901).

Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Grabner et al. in view of Okamoto et al. (U.S. Patent No. 5,502,461).

GROUPING OF CLAIMS

Applicant is of the view that, although all of the claims presented for consideration by the Board are allowable over the art of record, the patentability of individual claims should not stand or fall as a group. Specifically, the erasability of a visible trail as recited in claim 5 should be independently considered. Further, the transparency of the conductive layer of claim 6, the nature of the liquid crystal display of claim 7 and the use of a bezel that will mark edges of a touchpad should all be considered independently allowable over the art of record.

ARGUMENT

Claims 1, 2, 6 and 10-12 stand rejected under 35 USC § 103(a) as being unpatentable over Grabner et al., (U.S. Pat. No. 4,731,694). It is the position of the Examiner that Grabner et al disclose a touch pad module comprising a sensor and insulative and conductive layers as shown in column 3, lines 20-22, 31-61 and column 4, lines 26-30. The Examiner notes that Grabner et al discuss where the sensor layer is Fig. 1, items 7 and 8, and where the insulative layer is Fig. 1, item 24. Continuing, the Examiner notes that in a special embodiment of the touch

pad, the insulative layer 24 also comprises a metalized layer as a conductor on the upper flat surface. The Examiner thus concludes that it would have been obvious that this extra layer shows the three layers of the touch pad with the sensor layer on the bottom and the sensor layer and the conductive layer on top of the insulative layer.

Where the sensor layer comprises a capacitive touch pad, the Examiner turns to Grabner et al in Fig. 1 pointing to items 14 and 15 as well as to the dielectric layer of Fig. 1, item 6, which is discussed in column 3, lines 31-42.

Where the conductive layer is transparent, the Examiner points to Grabner et al for disclosure of different materials used in the touch pad as shown in column 4, lines 15-29 and where a plastic covering is called for, it is allegedly shown in Fig. 1 as item 24. The Examiner thus concludes that it would have been obvious to one of ordinary skill in the art to employ different types of materials with different properties.

Regarding claim 10, the Examiner notes that where the conductive layer comprises a sheet of plastic, Grabner et al is pertinent in its disclosure in column 3, lines 50-61. The Examiner notes that although Grabner et al fail to disclose a sheet of plastic embedded with conductive carbon, the conclusion is reached that it would have been obvious to one of ordinary skill in the art to include conductive carbon into sheets of plastic.

Regarding claim 11, where the signals can be registered by way of pressure or resistance, the Examiner turns to Grabner et al and its disclosure found in column 3, line 68 to column 4, line 3. The Examiner notes that Grabner et al fails to disclose that the capacitance generated is equal when either a finger or a stylus is used. However, the Examiner concludes that it would have been obvious to one skilled in the art that the touch pad would have been able to generate enough capacitance in order for the touch pad to perform. The feature of equal capacitance, according to the Examiner, would allow the touch pad to generate the same output regardless of the instrument used by the user.

Regarding claim 12, directed to the use of a bezel located over the conductive layer to prevent contact of that portion of the touchpad, although prior art does not disclose this feature, the Examiner concludes that it would have been obvious to one skilled in the art to employ this feature for it "could have been easily incorporated into the system." The Examiner hypothesizes that the bezel would enable certain areas of the touch pad, such as the edges of the sensors, to be off limits to the user.

Claims 3-5 and 8 stand rejected under 35 USC § 103(a) as being obvious and thus unpatentable over Grabner et al in view of Friend et al (U.S. Pat. No. 5,455,901).

As to dependent claim 3, the Examiner notes that Grabner et al fails to disclose the conductive object be it a finger or a stylus. The Examiner turns to

Friend et al for it is disclosed in column 5, lines 28-34 and concludes that it would have been obvious to one skilled in this art to incorporate a stylus into Grabner et al as it would have been needed as a means for input for the user.

Regarding claim 4, the Examiner notes that Grabner et al fails to disclose the concept of a conductive layer which is deformable to the conductive object resulting a visible trail being created on the surface of the conductive layer. The Examiner turns to Friend et al for its teaching in column 1, lines 41-54 concluding that it would have been obvious to one skilled in the art to incorporate this feature in Grabner et al.

As to dependent claim 5, the Examiner again turns to Friend et al in column 1, lines 55-63 regarding the erasability of the visible trail. The Examiner notes that Friend et al disclose an erasable handprint when an "X" is placed over it. The Examiner thus concludes it would have been obvious to one skilled in the art to incorporate this feature into Grabner et al as it allows a user to make corrections without exiting from the system.

As to dependent claim 8, the Examiner notes that neither Grabner et al or Friend et al disclose the notion of distinguishing between a finger and stylus. However, the Examiner concludes that it would have been obvious to one skilled in this art to incorporate this feature as the stylus and finger create different inputs. The Examiner notes that this feature is advantageous as the systems would be

able to distinguish between written inputs from the stylus and selections made by fingers.

Claim 7 stands rejected under 35 USC § 103(a) as being obvious and thus unpatentable over Grabner et al in view of Okamoto et al (U.S. Pat. No. 5,502,461).

As to dependent claim 7, the Examiner recognizes that Grabner et al fails to teach a layer of liquid crystal. The Examiner thus turns to Okamoto et al in column 4, lines 51-58 showing a liquid crystal display panel which is used for input and output. The Examiner thus concludes that it would have been obvious to one skilled in the art to employ a liquid crystal display into Grabner et al.

The present invention involves a touch pad module for use with an electronic device, such as a notebook computer, which makes use of such modules to implement user input functions. The touch pad module is configured of certain insulative and conductive layers and to enable the electronic device to sense input data from both a finger and stylus.

It is well recognized that capacitive touch pads, such as those described in the present application, work well with fingers, but are normally unable to sense a pen or stylus. Capacitive touch pads are typically used as pointing devices. Resistive touch pads work well with pens, but require an uncomfortable amount of pressure when used with fingers. Resistive touch pads are typically used as writing or drawing input devices. To date, there has not been a practical touch

pad which would work well with both fingers and pens along with a single input device to serve both functions. Such a touch pad would be especially valuable in portable applications where space is at a premium.

Turning first to the rejection of claim 1, applicant notes that Grabner et al disclose, in column 3, lines 18-22, a *matrix* of tactile sensors each with its own pressure sensitive resistor and capacitor. In column 3, lines 31-61 of the reference, a description is made of the use of metallization as being advantageous. However, the metallization of the reference is on a per sensor element basis with each element being one of a *matrix*. By contrast, claim 1 calls for a conductive coating which is contiguous over the entire sensor device surface not just over one element of the sensor. In addition, it is noted that Grabner et al, described, in column 4, lines 26-30, the use of a topmost metallization for the purpose of electrical shielding. As such, the metallization layer is only advantageous to the Grabner et al touch pad for the purpose of reducing influences of external noise. By contrast, the present invention employs a topmost conductive coating not for the purpose of shielding but instead as an active element of the sensing device. It is used for the express purpose of determining the location of contact of a conductive object.

It is respectfully asserted that claim 2 is equally patentable for the reasons recited above regarding the patentability of claim 1. The fact that claim 2 calls for perpendicular rows of electrodes separated by a thin dielectric layer does not

undercut the above-noted comments regarding the dramatic distinction between the touch pad module of claim 1 with respect to the teaching of Grabner et al.

Regarding claim 6, although it is true that many different materials could be used for covering the conductive layer, it is certainly true that Grabner et al discloses metallization of item 24, Fig. 1. The present invention is not taught or rendered obvious by Grabner et al in that while the touch pad of the reference requires a top side conductive coating for the purpose of sensing, this coating is not taught to be transparent and there is nothing in the prior art to suggest transparency. Certainly, producing a transparent metalized layer provides for additional functionality.

Regarding independent claim 11, applicant notes that Grabner et al relies on an external force such as a finger or stylus to modulate the value of R, item 5. The value of C, item 6, is not modulated or influenced by outside forces such as a finger or stylus. In fact, C is a constant regardless of whether any external influences are present. The present invention differs in that it relies upon a resistive sheet to effectively diffuse a capacitance caused by the contact of a conductive object onto the resistive sheet. The present sensor then measures this diffused capacitance. The conductive object could be a finger or a conductive stylus. By contrast, Grabner et al relies on force as an input mechanism and the object applying this force does not need to be conductive. Stated once again, the

present invention relies on the contact of a conductive object and a force is not required.

Turning to claim 12, although the use of a bezel to mark the edges of a touch pad may be obvious to a person skilled in the art, the present applicants use this bezel to cordon off outer regions of the sensor area which exhibit non-ideal performance. The choice of the size of this cordoned off area is by no means arbitrary as it involves sacrificing active sensor area. There is no art of record which suggests this embodiment and merely because, in hindsight, it seems to be a good idea, doesn't provide the basis for rejecting this claim.

Regarding dependent claim 3, it is noted that the present device requires and relies upon the electrical contact of a conductive device such as a finger or conductive stylus. By contrast, Grabner et al's sensor has no such requirement. The reference requires some object to apply a force to the sensor surface. A conductive object is of no benefit to Grabner et al's sensor whatsoever. Further, applicant is at a loss to determine what Friend et al's disclosure adds to Grabner et al and particularly in the cited column 5, lines 28-34. Friend et al discuss a display 102, a special stylus 103 and a form. No mention is made of a conductive stylus or object since neither would be of any benefit.

Regarding claim 4, applicant notes that Friend et al describe using a pen by directly writing on a display and then visually displaying those pen strokes with the display thus providing visual feedback. In the context of the description provided

by Friend et al, "display" refers to a computer display. This implies that any pen sensing device which overlays the display must, by necessity, be transparent. This would not be possible with the Grabner et al system since it cannot be made to be transparent. The present invention, as noted by reference to claim 4, differs in that it does not use a computer display to provide visual feedback. Instead, it provides visual feedback by providing a visual trail left by a conductive object, such as a stylus, on a deformable top layer of the sensor itself. Although such deformable top layer would be possible with the Grabner et al system, and the Grabner et al system could then provide visual feedback, such is not obvious from Grabner et al or from Friend et al. Again, Friend et al relies upon a computer display under the pen. The present invention does not.

Regarding claim 5, since a visible trail resulting from a deformable top surface is not shown by the prior art, the prior art cannot possibly render obvious the erasability of such a trail. Friend et al describe the use of a written gesture, a written "X," to signal the computer system that the pen strokes under the "X" are to be removed from the computer display. This is quite different from the present claimed touch pad module where physical deformation is removed. If the present visual feedback mechanism was to be applied to the systems of Grabner et al or Friend et al, the visual feedback would not be erased when an "X" was placed over it. In fact, the "X" would be displayed along with the previously drawn strokes.

Regarding claim 7, applicant notes that Okamoto et al discuss the use of a liquid crystal display to provide visual feedback. However, the reference describes what people have commonly come to know as a liquid crystal display, or LCD, such as those used in laptop computers. By contrast, the present invention describes the use of an actual, physical liquid crystal material to provide visual feedback in a similar way to the commonly employed toy "Etch-A-Sketch™ ." That is, the liquid crystal material is activated by responding to the contacts of a conductive object which, in turn, provides a visual response. This is not taught nor suggested by the prior art as it is an entirely unrelated use of liquid crystal materials.

For the reasons advanced above, it is respectfully asserted that the final rejection of claims 1-7, 11 and 12 was made in error and that the final rejection of the Examiner be reversed.

Respectfully submitted,

Dated: 6/11/01

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CLAIMS

1. A touch pad module to implement user input functions to an electronic device, said touch pad module comprising a sensor layer having a length and width for detecting position of a conductive object in contact with said touch pad module, an insulative layer positioned over and contiguous with said sensor layer and a conductive layer positioned over and contiguous with said insulative layer.

2. The touch pad module of claim 1 wherein said sensor layer comprises a capacitive touch pad comprising perpendicular rows of electrodes separated by a thin dielectric layer.

3. The touch pad module of claim 2 wherein said conductive object comprises either a finger of a user or a tip of a stylus applied to the surface of said conductive layer.

4. The touch pad module of claim 1 wherein said conductive layer is deformable to said conductive object so that contact of said conductive object to said conductive layer results in a visible trail being created on the surface of the conductive layer.

5. The touch pad module of claim 4 wherein said visible trail is erasable.

6. The touch pad module of claim 1 wherein said conductive layer is transparent.

7. The touch pad module of claim 6 wherein said module further comprises a layer of liquid crystal material which displays a visible change in response to contact of said conductive object.

8. The touch pad module of claim 3 wherein said touch pad module when used in conjunction with said electronic device can analyze capacitive measurements emanated from said module to enable said device to distinguish finger and stylus contact with said conductive layer.

9. The touch pad module of claim 1 wherein said conductive layer is of a resistance as to expand a small contact area of a tip of a conductive stylus into an image of suitable size for position measurement.

10. The touch pad module of claim 1 wherein said conductive layer comprises a sheet of plastic embedded with conductive carbon.

11. The touch pad module of claim 1 wherein the resistance of said conductive layer is such as to enable said module to generate an approximately equal capacitance when a finger or a conductive stylus tip is brought into contact with said conductive layer.

12. The touch pad module of claim 1 wherein a bezel is located over said conductive layer preventing said conductive object from contacting that portion of said touch pad module masked by said bezel.